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only be, for however brief a moment, only unimaginable pain and torment. A moment prolonged by the subjective slowing of time common in these situations.

American Airlines Flight 77

AA 77 departed Washington Dulles enroute to Los Angeles at 08:10. Aboard were 6 crew and 58 passengers (6 of them hijackers). The aircraft reached its assigned cruising altitude of 35,000 feet at 08:46. At 08:51 the flight made its last reported radio communication. Sometime after that, the hijackers assumed control although there were no reported stabbings, bomb threats, or use of Mace. The crew and passengers were herded back into the rear of the plane where they apparently remained for the remainder of the flight. This appears to be an extreme form of "quiescence" as the group had been informed via cell phone by family members that hijacked planes had been used to crash into the Twin Towers. The plane descended rapidly, and 5 miles west-southwest of Washington D.C., initiated a 330 degree turn at very low altitude and a high rate of speed. The pilot then advanced the throttles to full power and dove into the Pentagon at approximately 530mph (09:37). Through all these evolutions the victims were also subjected to severe buffeting, twisting and diving; all the time knowing what was in store for them. They knew what had happened in New York and could see that the flight path was intended to be a suicide run. They must have experienced a paralyzing terror which extended for all of at least 43 minutes. This was sufficient time for them to have run through the entire gamut of physiological symptoms and psychological terror. The sense of helplessness, the loss of all hope during those tumultuous final moments compounded by real physical "sickness," and the realization that only a horrific death awaited them seems beyond human comprehension.

United Airlines Flight 93

UA Flight 93 took off from Newark, New Jersey at 08:42. There were 8 crew and 33 passengers, in addition to the 4 hijackers. The events of the following 1 hour and 20 minutes differed significantly from the other hijackings. First, the plane flew for almost 42 minutes, undisturbed, before the actual takeover took place. When it did, the plane was flying over relatively open spaces so that the immediacy of the situation was not as impacting as those hijackings that occurred close to their targets and left the victims without realistic options.

The terrorists took control of the cockpit after an apparent vigorous fight with the flight crew. At least 2 crew members were reported either killed or severely wounded. Despite a bomb threat, the passengers and surviving crew members did not believe that to be real. There was no use of Mace or pepper spray and it also became obvious they did not possess firearms. Furthermore, the terrorists were fewer in number (4) than in the other affected flights. Numerous cell phone calls to and from relatives kept the victims apprised of what was going on and at the right moment in time leaders appeared to keep the group focused and motivated. Although the situation was dire, it did present options for potential survivability, and they acted quickly upon them. In reality, their cause was doomed because the terrorists were willing to crash the airplane if threatened by crew or passengers, and it would only take 1 or 2 seconds to place the aircraft in an untenable flight regime.

When the passengers revolted, the "pilot" began to roll the aircraft violently right and left to throw them off balance. In addition, he began a series of desperate up and down pitching movements. Recordings from the cockpit documents shouts and screams, crashing sounds from

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the adjacent galley, and evidence of a tumultuous, desperate, frenzied struggle right up to the moment of impact. In the final seconds the pilot pulled the control yoke all the way to the right, rolling the aircraft onto its back and putting it into a terminal dive, impacting the ground near Shanksville, PA at 580 mph. The time was 10:02.

Those last few minutes must have seemed like a scene from a horror movie. The desperation and fear of impending doom made worse by the realization that all their efforts would come to naught. The violent maneuvering certainly caused injuries beyond those that may have been inflicted by the terrorists. Alternating cycles of weightlessness and crushing "Gs," being smashed from wall to wall and from floor to ceiling, loss of orientation, and the final roll and dive to the ground must have generated extreme physiological responses. By this point most of the passengers would have been beyond rational thought. Some in the back would have been paralyzed by overwhelming and unrelenting fear and stress, while most of those involved in the assault would have added components of unfathomable rage and anger to their terror; a truly horrible way to die. It is hoped that in the last instants of their lives they understood that at least they had prevented a much larger catastrophe.

World Trade Center (WTC) and the Pentagon Building

Although the specifics of each incident differed, the impact zones will be addressed in a single section for the sake of clarity and conciseness. The majority of the casualties on 9/11 occurred on the ground in New York, particularly inside the so-called "twin towers" of the WTC. When AA 11 flew into the North Tower, for example, it hit between the 93rd and 99th floors, inclusive. According to the official 9/11 Commission report, the ensuing "jet fuel fireball" "shot down at least one bank of elevators" and "exploded onto numerous lower floors," down to, and including, the West Street lobby level and the B4 level, four stories below ground level. Reportedly, the burning fuel "immediately created thick, black smoke that enveloped the upper floors" and affected areas.

Death by immolation ranks as one of the greatest fears among humans and animals alike. The need to escape the holocaust must have generated a visceral panic response amongst all concerned. For some, tragically, severe traumatic injuries prevented their immediate escape from the flames and could not but suffer the intense heat and unbearable agony that accompanies such a fate. The lack of oxygen (used up quickly by the flames) added a measure of additional suffering as burning was accompanied by asphyxiation. Searing hot, noxious chemicals were inhaled by victims near the fires, producing severe and extremely painful irritation of the lining of the lungs. Death by fire itself involves initial symptoms of heatstroke, followed by thermal decomposition of organs, sloughing of the skin, bursting of the eyeballs, and finally massive loss of blood and body fluids. Such a death is neither rapid nor merciful.

Those trapped in elevators surrounded by fire, particularly the ones located in shafts through which the fireball descended, were even unluckier. They literally sat in red hot ovens and probably slowly cooked and asphyxiated to death. The mind cringes at such prospects and explains why so many victims facing death by fire chose to leap from the buildings to certain death. Approximately 200 persons are known to have chosen to end their lives in this manner rather than face the extreme torture of death by flames.

Those who leapt were subjected to another form of torture and agony. The terminal velocity of a 170 lb human being is about 120 mph. This translates into approximately 176 ft per second. Falling over 1000 ft will require between 5 and 6 seconds, an eternity when you are

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facing certain death. Subjectively, tachypnea will prolong the fall and permits the victim to be fully conscious of the absolute certainty of his or her death, to experience the rushing of air, the sudden feeling of weightlessness followed by rapid acceleration downwards, and perhaps tumbling end over end as they rush towards the ground. Where they to open their eyes they could anticipate the exact moment of the cessation of the self. And yet, cruelly, there is enough time to think of those you left behind, to feel regret and to feel sorrow.

After the initial impact, explosion, and fireball, survivors were faced with bleak prospects indeed. In general those in the floors above were trapped with no place to go. Debris and nonexistent or non apparent means of egress meant that their fates were sealed. Instinctually, many headed upwards towards the roof. Some thinking that perhaps a helicopter rescue was still possible. In the event, high winds from the blazing inferno below made that operation an aeronautical impossibility. When they reached the top, they found that the doors were in fact locked. The situation was desperate; neither flight nor fight was possible. The flames continued to surge from below, consuming some and forcing others into a desperate death leap. Death WAS certain. Only the method was yet to be determined. At this point all hope was lost and the psychological and neurophysiologic "storm" described in the background section was inevitable for many, if not most. Background sounds and snatches of conversations gleaned from brief cell phone conversations paint a picture of confusion, irrational comments ("call 911 and tell them we are under the desks"), and terror. For the occupants of the South Tower, their torture lasted 56 minutes before the last, dramatic act; the collapse of the building dragging all remaining survivors down to a fiery and crushing death. The North Tower collapsed after 75 minutes, merely prolonging the inevitable. The victims inside the Pentagon were spared the agony of being trapped beyond the reach of rescue services, but in every other way, the manner and extent of their suffering was similar in every way.

Survivors and Surviving Family Members

It appears as if every conceivable horrific and gruesome way to die was present on that day. However, the dead will suffer no more. For the survivors and family members, however, 11 September 2001 was not the end of an incredibly tragic chapter in their lives, but rather the beginning of long lasting, intense feelings of grief, guilt and regret. For extremely large numbers, this is translated into significant and disabling psychopathology. The scientific literature reveals that 67% of victims exposed to mass violence become severely (psychologically) impaired, as opposed to only 39% of those exposed to a technologically based disaster, or 37% of those exposed to a natural disaster. (Holloway et al, 1997; North et al, 1999) Psychopathology runs the gamut from Major Depression, General Anxiety Disorder, Sleep Disorders, Substance Abuse, and Adjustment Disorder, to Post Traumatic Stress Disorder. There is also some evidence that among children (whether primary victims or experiencing traumatic separation and dislocation as a result of the disaster) it may contribute to various forms of ASD (Autism Spectrum Disorder). (Ursano et al, 2007)

In addition, over 18,000 were left with significant lasting physical health effects. A study in 2010 found that all rescue workers had measurable, impaired lung functioning as a result of exposure to the smoke and dust generated at the incident sites. Significantly, 30-40% reported no improvement of symptoms after almost 10 years. (Grady et al, 2010) Ominously, there is evidence that exposure to these sites may have also contributed to fetal abnormalities and congenital problems amongst pregnant women present at the WTC, either as rescuers or as


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congenital problems amongst pregnant women present at the WTC, either as rescuers or as survivors. (CCCEH Study, 2006)

Conclusion

I attest to a reasonable degree of medical certainty that the suffering of all the victims on 11 September 2001 was gruesome and painful in the extreme, and that the majority of survivors and surviving family members will continue to relive the events of that fateful day for a significant portion of their natural lives. For many loved ones, modern communications (cell phones) enabled them to share the experience from a distance; experiencing the horror, but not the physical suffering. Thus, grief becomes compounded by guilt, and enduring – and very real and vivid – memories of the tragedy. Unfortunately they are condemned to keep reliving the experience through the unabated media coverage that continues to this day. *Many, if not most will require ongoing psychological/psychiatric intervention.* The effects on children who lost parents on that day are immeasurable. The effects of 9/11 will thus continue across generations and for decades to come. Finally, the tragedy has become imprinted on our national psyche, and our lives have all been negatively affected in one way or another. It contributed directly to our involvement in two wars and the consequent additional death and suffering. Long lines at the security checkpoints in airports, ubiquitous government surveillance, suspiciousness of our own Islamic countrymen, etc, are all ways in which we as a nation may have lost our innocence.

Respectfully Submitted,



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